FILE

MEMORANDUM

SUBJECT: Meeting with Urban Interests on draft RIA on March 1, 1994

FROM: Palma Risler, W-3-3

TO: File

DATE: March 2, 1994

Background

On Tuesday, March 1, 1994, we held a second meeting with urban interests to discuss the draft RIA prepared for the Bay/Delta WQS. The meeting was requested by urban interests at the first meeting and held at EPA offices in San Francisco. An attendance sheet is attached listing the participants. An agenda is attached, along with meeting materials called "Tentative table of research tasks for Bay/Delta RIA." The meeting was fairly informal with participants providing feedback on the issues listed in the meeting materials.

The following is a list of discussion items and issues raised during the meeting. No attempt has been made to identify the person making the comments. The discussion generally followed the meeting materials and these notes are organized roughly by topic. One paper on reclamation costs was submitted at the meeting and a one page copy of notes from Dr. Hanneman on consumer surplus estimation. Both are attached.

Patrick Wright opened the meeting and briefly updated the group on the public hearings and the schedule. He noted the letter received by EPA from the environmental groups that emphasizes the 90 day deadline in the CWA.

Issues/questions/comments

1. Schedule. What other legal action has taken place? What is the lawsuit about critical habitat about?

2. 800k and overlap with CWA. A formal request to USBR for an analysis was suggested.

3. Supply/delivery impacts. ERM simulates some local delivery impacts. EBMUD, SCVWD and SFWD all conduct similar analysis. Questions were raised about whether or not DWRSIM and ERM have information on the CVP.

4. Pro-rata analysis. Discussion about the problems with different databases (water rights and reservoir information). Isn't there information on real diversions? What was done in Bulletin 160? Isn't there something inherent in the DAU analysis in DWRSIM? For urban analysis, using just two cost scenarios (Bay area and south coast) was objected to as too simplistic.

5. New scenarios. How would anyone realistically analyze prorata. Will these new scenarios drop the emphasis on transfers. The south of delta scenario should be changed to a project only scenario. The fee/fund scenario could conceptually avoid physical transfer bottlenecks, possibly be a state auction, like an enhanced state waterbank.

6. COA split. Seems reasonable to ask the FED for an formal assumption.

7. Transfers cross-delta. Discussion centered on questions regarding whether or not the biologically opinions were flexible or not. How are the take limits and other environmental requirements interact in theory and in practice? Comment were made that the winter-run opinion not the delta smelt opinion were restrictive.

8. Transfers - other. Comments were made on the need for a baseline for transfers. Many urban agencies are counting on transfers to meet current or projected water demand and thus all the transfer capability is not available to meet reductions from CWA requirements.

9. Baseline for urban growth. Much discussion took place on the issue of effecting water supplies and planning for future growth. Many participants maintained that the draft RIA, especially the costs used, do not reflect the way urban agencies plan and pay for replacement supplies. Suggestions were made that the issue isn't which cost to use but accounting for agencies having to put higher cost replacement supplies on line sooner. Some type of discounting scheme was suggested.

10. AG- modeling. Discussion on CVPM model and why it's advantageous to use this model.

11. AG - groundwater. Possibly the case studies already completed or proposed or information from public comment will provide the cost information needed.

12. Consumer surplus losses from urban demand management. Much discussion started on this topic. What percent shortage was assumed.

Participants had spoken to Dr. Michael Hanemann and reported a 15% shortage was assumed. Palma Risler suggested that because there was so many issues to discuss that we hold a special meeting just on the topic of consumer surplus estimation with UC interested professors attending.

13. AG- community impacts. The PV/MET fallowing program may also be developing information on community impacts.

14. # of fish. Will there be an opportunity for others to participate in the re-estimation? Why not use the Jassby equations?

15. Expand cost-effectiveness/cost-benefit. Suggestions on looking at where the cost curve becomes steeper and the benefits are not rising. Is the number of days a possible variable to use?

16. Long run v short run. Need for greater discussion and consistency, but what is the possibility of doing a more dynamic study?

17. Critical habitat. How can the analysis be done before the final proposals? Especially if the biological opinion changes?

18. Government regulatory costs. Won't there be greatly increased governmental regulatory costs? Or are these costs (e.g. payments for administrative costs of transfers) borne by the water users?

19. Urban users fixed costs. The draft RIA mistakenly assumes that water users do not have to pay for the cost of delta water if they use a replacement. However, the fixed costs of the projects must be payed whether or not water is delivered. Comments were made that although MET allows retailers to subtract MET costs, it would not work this way on the wholesale level. Comments were made that the issue of increased demand was important here.

MARCH 1, 1994
URBAN MTG – RIA

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***** MEETING REMINDER *****
PLEASE RSVP TO PALMA RISLER AT 415/744-2017

REGULATORY IMPACT ASSESSMENT - UPDATE
URBAN INTERESTS

Tuesday, March 1, 1994
1:30 - 3:00

75 Hawthorne Street
San Francisco
18th Floor - RA's Strategy Room

Meeting Objective: Update and discussion of issue identification for the RIA analysis.

1:30	**INTRODUCTIONS** **Schedule/Public Hearings**	**PATRICK WRIGHT**
2:00	**Update on identification of issues** **Tentative research process** **Discussion**	**PALMA RISLER**

For further information, please call Palma Risler at 415/744-2017

2/28/94
Tentative table of research tasks for Bay/Delta RIA

TOPIC	POSSIBLE STRATEGY	STATUS
Supply - 800k baseline - overlap with CWA rqmnts	- use historical info - use PEIS approach - request USBR analysis - get Clubfed decision	- research needed
Supply - delivery impacts - ag/urban policies	- use info from DWRSIM (not just af) as inputs into econ - use parts of ERM	- under discussion with DWR
Pro-rata analysis	- Need geographic cost curves for urban? - Ag/urban use PEIS analysis from water rights database	- need to research - wait for info from comments
Scenario's unrealistic	- change: south of delta; pro-rata; fund or fee system	- wait for public comments
COA split	- State/Fed interpretations under discussion - CLUB Fed give EPA assumptions	- decision thru FED in spring
Transfers - cross delta	- PEIS may have info - Historical info on take limits	- research PEIS - DWR analysis?

Transfers - extent of current market	- PEIS may have info - RB5 Calpoly info?	- collect other studies
Ag - critique of estimation/modeling	- Use CVPM and expand rationing - Add case study	- under discussion with DWR
Ag- GW	- Modeling doubtful - Use estimates of increased costs and qualitative discussion	- need more info - comments may have info
Ag - community impacts	- Possible 2 county case studies (fallow, unemploy, tax, bankrup, gw) - PEIS case studies on community well being - RB5 Calpoly info?	- scope need after comments - collect info from other studies
Urban - price increases; actual shortage policies/frequency	- need in addition to consumer surplus info	- public comment info
Urban - consumer surplus/econ impact of shortages	- use range? - Alameda, SF, redo MET - Discuss with urban group	- public comment info
# of fish	- use range/assess models/bpj	- need to start obtaining input

Redo econ of fish	- Consistency with ag (use of multipliers) - get estimation of overall recreational fisheries benefits	- wait till after comments
Expand cost/benefit; cost/effect	- Needs expanding	- need to scope
Consistency of LR v SR	- Need consistency	- need to scope
Fee/Fund	- track policy discussions	- need to scope

NON-POTABLE WATER RECLAMATION PROGRAM

The 1994-1999 five year CIP includes funds for a regional Nonpotable Water Reclamation program to fulfill the requirements of Regional Board Order 93-117. This program is designed to deliver up to 87,000 acre feet of reclaimed water per year over a 150 square mile area in six cities for use in landscape irrigation, agricultural irrigation and as industrial process water. The effect of the completed project will be to divert 70 mgd of effluent from San Francisco Bay during the dry weather months, preventing further conversion of salt marsh in the vicinity of the plant outfall, reducing the discharge of trace level contaminants, and providing a reliable source of nonpotable water to offset potable demands.

The project is budgeted in three phases. Phase 1 provides 17 mgd of reclaimed water to the Golden Triangle area, and is scheduled for completion in November, 1997 at a cost of $130 million. It includes construction of an effluent diversion structure, reclamation pumping station, transmission line and more than fifty miles of distribution pipe. Phases 2 and 3 expand the distribution system to south San Jose and the cities of Campbell, Cupertino, Saratoga, Los Gatos, and Monte Sereno. Phase 2 will increase the capacity of the system by 88 mgd to a total of 50 mgd average dry weather flow to meet the minimum requirements of the Regional Board order (and specified in the City's Action Plan); construction is scheduled for completion in December, 2000 at a cost of roughly $220 million. Once the Phase 2 infrastructure is in place, an additional 20 mgd of capacity can be obtained in Phase 3 at an additional cost of only $50 million. The total cost of the project is estimated at $400 million.

These estimates are significantly higher than those included in the 1993-1998 CIP budget. Aside from adjustments for inflation, increases are due to previously unbudgeted project elements; realignment of the system as recommended by the recently completed Market Assessment Study; and increased capacity of the system from 60 mgd to 70 mgd to serve the expanded potential market.

Previous estimates for Phase 1 did not include the cost of distribution pipe needed to bring nonpotable lines from central areas to individual customers, or the cost of connecting nonpotable service to customer systems. It was anticipated that some of these costs would be assumed by other entities (customer or retailer), but this no longer appears likely. In addition, the Phase 1 effluent diversion structure and reclamation pump station facilities are now sized to permit expansion of the system to a full capacity of 70 mgd. These changes together added roughly $50 million to the cost of the Phase 1 project.

The most significant increase in project costs resulted from the need to realign the distribution system to reach the potential market for reclaimed water identified in the Market Assessment Study. Prior to the study, market densities in the Expanded Area were assumed to be comparable to the Golden Triangle Area, where potential customers are relatively close together. CalTrans was identified as a major customer, using reclaimed water to irrigate miles of median strips, and the reclaimed water pipeline was located along two major freeway corridors (Highways 85 and 87).

However, CalTrans subsequently determined that the pipeline could not be located in their right-of-way because it conflicted with highway structural sections. Furthermore, the Market Assessment Study revealed that, while the potential demand for reclaimed water was larger than previously thought, customers were distributed throughout the service area at a relatively low density. As a result, a more extensive distribution system was required to provide adequate effluent diversion. Changes in the alignment and layout of the distribution system added approximately $100 million to the Phase 2 cost of the project.

On the other hand, the Market Assessment Study located an additional 20 mgd of potential demand for reclaimed water, further ensuring that the Nonpotable Water Reclamation program will provide sufficient diversion to enable the Plant to meet the wastewater treatment needs of the tributary area in years to come. Once the Phase 2 distribution system has been constructed to serve the 50 mgd of potential market required by the Regional Board, this additional market can be reached for an incremental cost of $50 million, which was not included in the previous year's budget.

Cost estimates from the 1993-98 CIP based on 1995 dollars have been escalated at 5% per year to the mid-point of construction to account for inflation. Although the figures provided are within the range of budget level estimates for a project of this size and complexity, it should be noted that they are preliminary in nature and do not contain right-of-way acquisitions, environmental mitigation costs that may result from Phase 2 environmental impact studies, or other unforeseen project costs. All such additional budget adjustments will be made as the program progresses through final design and construction.

Project Summary

City of San Jose, California
Santa Clara Valley Water District
Nonpotable Water Reclamation
Demonstration Project

February, 1994

up from $325M

General Description

The City of San Jose (CA) Nonpotable Water Reclamation Demonstration Project is a $400 million program to reclaim up to 37,000 acre-feet per year (AF/yr) of wastewater treatment plant effluent for use in landscape and agricultural irrigation over a 150 square mile area in six cities in the Santa Clara Valley. The affect of the completed project will be to divert 70 million gallons per day (mgd) of effluent from San Francisco Bay during the dry weather months, preventing further conversion of salt marsh, reducing the discharge of trace level contaminants, and providing a reliable source of nonpotable water to offset potable demands.

Phase 1 of the project will construct fifty miles of pipe and will reuse 9,000 AF/yr of reclaimed water in a fifty square mile area with roughly 3,000 acres of landscape and agriculture. This area, which has a high density of parks, industrial parks and other irrigable facilities, is known locally as the "Golden Triangle," and marks the intersection of the cities of San Jose, Santa Clara, and Milpitas. All of the cities are participating actively in this project, which will cost $130 million and is scheduled to be completed in November, 1997.

9,000 AF

Phases 2 and 3 will expand the distribution system to south San Jose and the cities of Campbell, Cupertino, Saratoga, Los Gatos, and Monte Sereno with the construction of an additional 200 miles of pipe at a cost of roughly $270 million. Scheduled for completion in December, 2000 at a cost of roughly $220 million., Phase 2 will divert an additional 33 mgd to prevent further conversion of salt marsh by the discharge of the City's fresh water effluent, as required by the City's NPDES Permit. Once the Phase 2 infrastructure is in place, Phase 3 will complete the extension of the system with an additional 20 mgd of capacity at a cost of $50 million.

Upon completion, the cost of reclaimed water supplied by the Nonpotable Water Reclamation Project will be roughly $1200 per acre foot; Santa Clara Valley Water District, the local water wholesaler, has agreed to subsidize the program by $93/AF. All capital and operating costs are currently the responsibility of the City of San Jose and the jurisdictions tributary to the regional wastewater treatment plant.

$1,200 /AF

Benefits

The primary benefits of the Nonpotable Water Reclamation program are 1) reduction of effluent discharge from the regional wastewater treatment plant, and 2) production of a reliable water supply to offset potable demand in a drought-prone, water-short area.

P. 03

up to

The San Jose/Santa Clara Water Pollution Control Plant is a 167 million gallon per day (mgd) advanced wastewater treatment plant which discharges into an estuary at the southern end of San Francisco Bay. Although treated nearly to drinking water standards, the fresh water effluent from the plant has been found to contribute to the conversion of salt marsh rendering it unsuitable as habitat for two endangered species (the salt marsh harvest mouse and the California clapper rail). The planned reclamation of 40% of current plant flow will prevent further salt marsh conversion. As an auxiliary benefit, diversion of reclaimed water will reduce the mass of trace metals discharged to the Bay.

In 1987, California entered into a six-year drought which once again required water suppliers to implement water rationing and other conservation measures. In Northern California, several municipalities, including the City of San Jose, passed ordinances prohibiting the use of drinking water for purposes such as dust control in construction where nonpotable or reclaimed water was available. Although above average rainfall in early 1993 marked the end of the latest drought, many restrictions on water reuse remain in effect, in recognition of the fact that natural supplies of drinking water are no longer sufficient to keep up with current demand. This is especially true in highly developed regions like the San Francisco Bay area, where reclamation is expected to play an increasingly important role in offsetting demand for drinking water by providing an appropriate substitute for nonpotable purposes. The Nonpotable Water Reclamation Project will be capable of satisfying a peak demand of over 80 mgd, anticipated at certain times during the summer. This demand, mostly for landscape irrigation, would simply not be met during a period of drought similar to the one recently experienced.

Project Status: February, 1994

The conceptual design stage of the project is nearing completion. Both market assessment and environmental impact reports has been completed for Phase 1, as have preliminary plans for the layout of piping in the Golden Triangle. A market assessment for the expanded area has been completed, and a preliminary layout of pipelines has been discussed with representatives of all jurisdictions involved. A project management consultant will be hired within the next six months , and final design for the Phase 1 work is anticipated to begin in July, 1995.

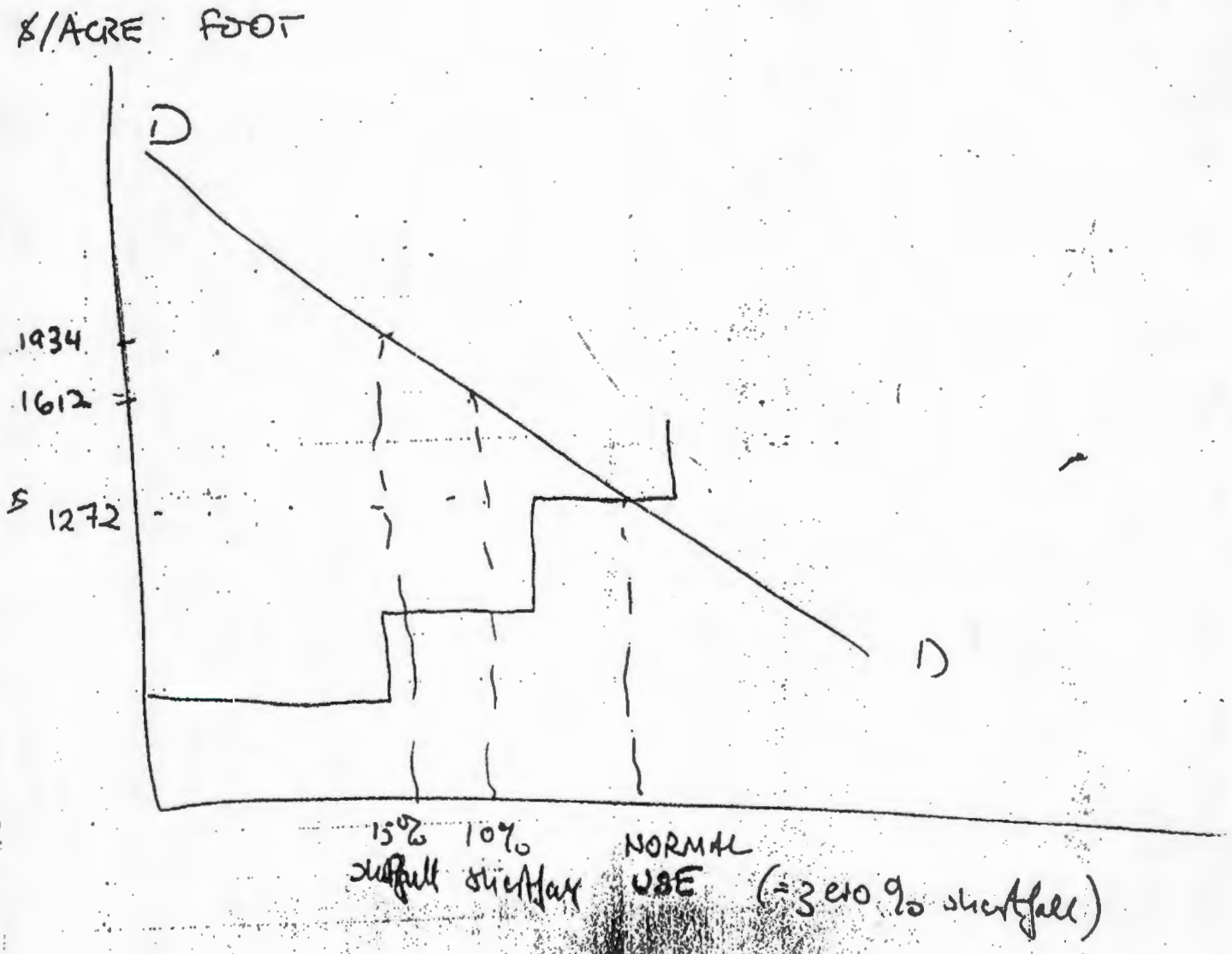
Current efforts are focused on resolving pipeline alignment issues, and constructing the framework of institutional arrangements, including agreements with water retailers and a program to retrofit existing customer piping to supply reclaimed water. If successful, the San Jose Nonpotable Water Reclamation Project could provide direction to similar efforts throughout the United States.

follows:

$0 \le x \le 10$ Total outage cost $= 1272x + 17x^2$

$10 \le x \le 20$ Total outage cost $= 14{,}420 + 1612(x-10) + 32.2(x-10)^2$

$20 \le x \le 25$ Total outage cost $= 33{,}760 + 3456(x-20) + 37.9(x-20)^2$



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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION IX
75 Hawthorne Street
San Francisco, Ca. 94105-3901

MAR 02 1994

MEMORANDUM

SUBJECT: Summary of Bay/Delta Public Hearings
TO: Addressees
FROM: Patrick Wright, EPA Region 9

Summary

As expected, the general level of interest in the public hearings was relatively low. With a few exceptions, including John Wodraska of MWD, Tom Clark of Kern County, and John Krautkraemer and Barry Nelson from the environmental community, the leaders of the major stakeholder groups did not participate in the hearings. The Region encouraged the major groups to work with us to address their concerns, rather than taking us on in the press and at the hearings, and most have agreed. In fact, there were virtually no highly critical comments voiced by the State or any of the major stakeholder groups at the hearings. We also understand that the leadership of the urban and agricultural groups are taking seriously our commitment to consider changes to the standards and economic analysis, and we expect to receive a great deal of constructive and useful written comments. A total of about 130 people spoke at the four hearings. Most were individual farmers or leaders of smaller water districts.

Press coverage: Press coverage was also very light. None of the leading environmental reporters from the major papers in San Francisco, Sacramento, and Los Angeles attended the hearings. They all correctly assumed that the comments from the interest groups would not be any different than those expressed on December 15. The few stories that did appear, including two from the LA Times, focused on comments about the water supply and economic impacts of the proposals from local elected officials, individual farmers, and other members of the public rather than on comments from the major interest groups.

Fresno (2/23)

The Fresno hearing was well attended (about 40 people spoke) by local farmers, who staged a small tractor parade before the hearing. One elected state official was present, State Senator Phil Wyman, who was upset that Betsy Rieke and other Washington officials were not conducting the hearing. His remarks incited the crowd, which became rude at times. The leadership of the agricultural groups, some of whom were present but did not participate, later apologized for their behavior. Virtually all of

the speakers voiced concerns about the water supply and economic impacts of the proposals. Only one person spoke on behalf of the environmental community, late in the day.

Press coverage: Several local network affiliates covered the hearings, and included our statements in spots that appeared in Fresno, Bakersfield, and Sacramento. The local writers from the LA Times and AP also wrote stories, but focused on the comments from local farmers.

Sacramento (2/24)

About 20 people spoke in Sacramento, including Doug Wheeler on behalf of the State. He expressed various concerns about the proposals, but pledged to work with us in developing a framework agreement for state/federal coordination on the standards and other issues. (A meeting to discuss the State's draft framework agreement is scheduled for Tuesday, March 8.) There were few substantive comments.

Press coverage: A couple of print and radio reporters were present, and an article appeared in the Fresno Bee.

San Francisco (2/25)

Only 11 people spoke in San Francisco, including representatives from San Francisco and East Bay MUD, the environmental groups, and a couple of farmers from the Central Valley.

Press coverage: A couple of reporters were present, but no stories appeared.

Irvine (2/28)

The Irvine hearing was well attended (about 60 speakers), and many thanked us for coming to southern California. Most of the speakers represented small water districts or local communities. John Wodraska of MWD and Tom Clark of Kern County were the only representives from the major stakeholder groups. They both recommended flexible standards, continued federal coordination, and a joint state/federal task force on long-term solutions. They also pledged to work with us in developing the final rule and economic analysis. Wodraska noted that MWD would be submitting joint comments with the other urban agencies, north and south, who are developing an alternative proposal. (He will be briefing us on their proposal this Friday (3/4)). John Krautkraemer from EDF in Oakland was the only speaker on behalf of the environmental community.

Press coverage: Reporters from the LA Times and local papers were present, but did not use our comments or opening remarks in their stories. One local cable station was also present.

FILE

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION IX
75 Hawthorne Street
San Francisco, Ca. 94105-3901

MEMORANDUM

SUBJECT: Meeting with Electric Power Interests on draft RIA on March 3, 1994

FROM: Palma Risler, W-3-3

TO: File

DATE: March 7, 1994

Background

On Thursday, March 3, 1994, Palma Risler met with several representatives of electric power interests in Sacramento regarding the draft RIA prepared for the Bay/Delta WQS. An attendance sheet is attached listing the participants. The meeting was informal with no prefixed agenda. Ms. Risler asked many questions to help clarify potential impacts on power. The following is a list of discussion items and issues raised during the meeting. No attempt has been made to identify the person making the comments.

1. How have operations been changed since CVPIA and ESA?

2. It is difficult to predict implementation, you need to start with what the flow regime will be.

3. The power issues include: flows and timing of flows.

4. Timing of the standards (Feb - June) is not the best time for power generation (July - Sept 15 is peak generation.)

5. Project use takes the first priority for power. The Tracey pumps use power so although project use may decrease due to CWA requirements, the timing of project use may not decrease during times of greatest economic value.

6. EPA should be careful in attributing too much economic impact to a baseline that includes ESA. Hopefully, ESA requirements will not be needed in the future and then all the economic impacts are attributable to CWA requirements.

7. Economic impacts are due to project repayment, not just power economics. Many have made assumption that power can pick up costs after a reallocation process. However, if power has to pick up too much cost it can cost itself out of the market.

8. Project repayment is not like the SWP, the CVP doesn't charge for project cost if it doesn't deliver water. This may also affect surcharges for the restoration fund.

9. Utilities that buy from the project have capabilities to purchase from the outside.

10. ESA's impact on energy costs has already been noticed.

11. This impact is difficult to quantify because there are complicating variables such as a short term surplus and the Pacific Northwest intertie.

12. The winter-run opinion is having an impact because they are bypassing Shasta and reducing exports. When you bypass there is a capacity impact, where fixed costs are leveled on a smaller customer base.

13. The current contract with PG&E makes this less of a short term issue, but the contract changes in 2004.

14. Power users need firm capacity.

15. When the flow regime changes it impacts project dependable capacity, reduces generation and depends upon the timing and value of the generation.

16. A prorata approach may not make a difference in the economics. Its not clear if the CVP is a good proxy for impacts on all users.

17. There aren't that many tributaries to the delta and the replacement cost of energy would be approximately equal.

18. The Roe Island location affects power because it impacts carryover storage.

19. Impacts in the drought are important, during critical years even the Chipps Island location may affect carryover storage.

20. The RIA would be an incomplete document without a discussion of power impacts. A quantitative assessment may be difficult given all the variables.

Meeting w/ EPA

3/03/93

Name	Organization	Phone
Nanrette Engelbrite	WAPA-SAO	(916)649-4534
John Anderson	"	(916) 649-4419
Jeff Phipps	RW Beck/CVP Customer Tech Committee	(916) 929 3653
Harold Meyer	NCPA/WRMI	(916) 920-1811
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Palma Risley	EPA	415/744-2017
GLEN YOUNKIN	WESTERN/OPS	(916) 978-4864

Admin Record File

A SLIDING SCALE FOR THE EPA SALINITY STANDARD

Wim Kimmerer

March 8, 1994

Prepared for the California Urban Water Agencies and Natural Heritage Institute

Background The proposed EPA salinity standard consists of the number of days during February-June on which salinity is less than 2 ppt at three control points: Roe Island at 64 river kilometers, Chipps Island at 74 km, and the river confluence at 81 km. This standard is intended to approximate various mean values of X_2, the longitudinal position of 2 ppt salinity 1 meter off the bottom. The standard is set differently for each of 5 water year types to reflect interannual variability in availability of water to the system.

The selection of numerical values for the standard was based on a reconstruction of the historical record of salinity. The historical time series of salinity at the three control points was reconstructed by EPA using the Dayflow estimates of delta outflow and the Kimmerer-Monismith X_2 equation to estimate the number of days in February-June when salinity was less than 2 ppt at these points. The purpose of this reconstruction was to determine an appropriate frequency of exceedance of 2 ppt at these points, under the assumption that this frequency gave adequate protection to the estuary in times past but not in the last 15-20 years.

Variability in the number of days' exceedance is governed by two factors: the amount of unconstrained flow, and the level of development of water projects. Both of these depend on the years selected as the reference period, i.e. the time period over which the number of days' exceedance is determined. Although there is general agreement that a wide range of hydrologies is needed, there is disagreement over the range of years to use because of the issue of level of development.

The standard proposed by EPA is widely perceived as too rigid in its use of water years, each of which encompasses a wide range of actual water availability. At the recent workshop on salinity standards held at Stanford University, several speakers objected to the selection of water years and of reference periods for determining standards. In addition, George Barnes from the Department of Water Resources presented an analysis demonstrating that level of development (as indexed by calendar year) had a substantial influence on the relationship between total unconstrained flow and X_2. This is no surprise, but it has led to debate over the proper selection of reference years to use in setting the standards.

Objective The main objective of this study was to devise a sliding scale taking into account the natural variability of availability of water, and to separate the issues of level of development and natural variability in hydrology. A secondary objective was to explore alternative methods of averaging to determine their effect on achievement of the standard.

Averaging methods As originally conceived, the proposed EPA standards set the minimum number of days in February-June when salinity at each control point must be no greater than 2 ppt. This standard was considered operationally impracticable, so EPA modified this to use a 14-day running mean starting on February 1. Thus, the salinity at each control point would be calculated as a running mean for the period from the current date to the date 14 days earlier, but not before February 1.

EPA requested suggestions for alternatives to this scheme that would achieve protection at greater operational ease. Contra Costa Water District suggested that a day be considered as meeting the standard if one of three conditions were met: the actual salinity on that day, or the running mean, was under 2 ppt, or the calculated net delta outflow was sufficient to achieve the standard under steady-state conditions.

David Fullerton of NHI suggested simply averaging days slightly above and below 2 ppt to allow, for instance, a day at 2.5 and a day at 1.5 ppt to be counted as two days at 2, thereby achieving the standard. Days with salinity greater than 4 ppt would not be included. To calculate this standard, the salinities in the month (for this analysis; if applied this scheme would be used across the 5-month period) are ranked in increasing order. The mean of all days from the lowest to the highest value less than 4 ppt is calculated; if over 2 ppt, the next highest is used, and then the next until the mean of *n* days is not over 2 ppt. This number *n* is the number of days on which the standard was met in this month. Operationally, this standard would be met by trading off days in different parts of the season. It has the advantage over the running mean that operators can take advantage of periods of high flow and are not hurt excessively by brief periods when the daily mean salinity is well over 2 ppt. It appears to be operationally workable (Jim Snow and Paul Fujitani, pers. comm., March 1994).

This analysis compares the relationships between the monthly mean X_2 and the number of days' exceedance of 2 ppt under four schemes: no averaging, a 14-day running mean, CCWD's scheme, and Fullerton's scheme. Data used for this analysis included the daily salinity data from the USBR monitoring stations, used in initial calculation of X_2, and the monthly mean best estimates of X_2 from the same series. For each control point, running mean salinity was calculated starting on February 1. For each month in the series (1968-91), the station closest to X_2 was selected and the number of days on which salinity was not over 2 ppt was calculated under each of the 4 schemes.

To take into account the different positions of the stations, the number of days' compliance with the standard was plotted against *Delta* X_2, the difference in km between X_2 and the nominal position of the station. This allowed all data to be combined in a single analysis, under the assumption that the relationship between

Delta X_2 and number of days' compliance would be the same for each station. Examination of residuals from the analyses suggested that this was the case.

Figure 1 shows the relationship between the proportion of days' compliance and Delta X_2 for each of the four schemes. The line fit to the data is a logistic function, appropriate for a relationship between a dichotomous variable (i.e. compliance or no compliance) and a continuous variable (Delta X_2). The value of Delta X_2 at which the line crosses 50% compliance should be close to zero. In Figure 1, it can be seen that this line moves further from 0 for the four averaging schemes. With no averaging it is not zero because the relationship between X_2 and salinity at any point is nonlinear. With more averaging this crossover point shifts to the right, or to a higher mean X_2, because an increasing number of higher salinity values are allowed to represent compliance with the standard. However, it is useful to note several features of these graphs. First, all of the averaging schemes result in more values at the extremes, either 0 or 100%, because salinity does not vary much within most months. Second, the variability around the line is highest for the CCWD scheme, lower for the 14-day running mean, and lowest for the Fullerton scheme. Thus, this latter scheme would give the greatest certainty that achieving a given number of days' exceedance would also achieve a certain value of X_2.

Effects of hydrology and level of development Data used in this analysis were daily estimates of X_2 either from the 1968-91 series or estimated from Dayflow using the Kimmerer-Monismith equation. Note that this equation and the CCWD antecedent conditions equation give roughly the same values for number of days at each control point.

I had data for 1930-1991, but selected 1930-1975 for analysis because flow standards in 1976-91 altered the relationship between X_2 and unconstrained flow. Mean X_2 and number of days on which salinity was less than 2 ppt at each of the three control points was determined for the February-June period of each year without averaging.

The analysis proceeded in two stages which were then combined. First, an equation predicting mean X_2 from flow and year was determined; next a logistic function for days of compliance as a function of X_2 was determined in a similar manner to that described above; and third, the two equations were combined and parameters redetermined in an overall regression analysis.

For periods when it is not measured, X_2 is linearly related to log of delta outflow. Thus the log of unconstrained flow was chosen as a predictor variable. Preliminary analysis revealed that unconstrained flows from rivers in the Sacramento and San Joaquin basins and eastern Delta were highly correlated. Based on principal component analysis, there appeared to be no major mode of variability in these

data that was not incorporated in their total, and that explained any of the variation in X_2. Thus, the total unconstrained flow, averaged over February-June, was used in the analysis.

Table 1 shows the results of this multiple regression analysis. The R^2 value of 0.97 indicates that this analysis captures all but 3% of the variation in X_2 (Figure 2A).

In the second analysis, data from all control stations were combined and plotted against Delta X_2 as described in the previous section. The data were then fitted to a logistic regression, which had an adjusted R^2 of 0.94 (Table 2, Figure 2B).

The combined analysis expressed the percent of days at or below 2 ppt as a function of year, log of total unconstrained flow, and position of the station in kilometers. As with the previous analysis, this allowed all three stations to be used in the same analysis. This analysis gave an R^2 of 0.92 (Table 3). In Figure 2C, the data for the entire period (1930-1991) are plotted and it becomes clear that the later years deviate considerably from the relationship. This is also apparent in Figure 2D, where residuals are plotted separately for each control point. Before the mid-1970s, the residuals are similar for each point, and rather small with a standard deviation of 8% of days (i.e. 12 days). After that time, the residuals for Chipps Island and especially the confluence generally are positive and those for Roe Island negative, probably because D-1485 standards protected flows at the upstream locations.

On the basis of the above results, we have a model that gives the number of days not exceeding 2 ppt as a function of year, unconstrained flow, and location. The model is illustrated in Figures 3 and 4. In Figure 3, the combined effects of flow and year can be seen for each control point. As expected, in any year the number of days under 2 ppt increases with increasing flow and is highest upstream, but the relationship has shifted over the years as water has been increasingly used and impounded.

The effects of selecting alternative reference years are given in Figure 4, which show slices through the surfaces in Figure 3 for 1940, 1958, 1968, and 1975. The different years cause considerable difference in the number of days ≤ 2 ppt at each station, especially over the range at which X_2 is near that station and the number of days changes rapidly.

Table 4 presents the days at or below 2 ppt for several flow values assuming a 1975 level of development. In contrast to the EPA standards, the number of days at the confluence does not reach 150 except under high-flow conditions.

Figure 5 shows the February-June flow as a cumulative frequency distribution for

1930-75 and 1976-91 separately. This figure illustrates that the flows in the historical period used are representative of the full range, except that the later period included both the highest- and lowest-flow years. The later period had, as expected, more drought years and more high-flow years than the historical period, but since nearly the entire range is included in the historical period, it can be used without excessive extrapolation.

Table 1. Results of multiple regression analysis of X_2 vs. the log of total unconstrained flow (February to June) and year. The model for this regression is:

$$X_2 = A + B \times Year + C \times LOG_{10}(Unconstrained\ flow,\ MAF) + Error$$

Parameter	Degrees of Freedom	Value	p value
R-squared		0.97	<0.0001
A	1	114.57	<0.0001
B	1	0.16959	<0.0001
C	1	-50.396	<0.0001
Error	43	-	-

Table 2. Results of logistic regression analysis of percent of days when salinity at a control point was 2 ppt or less vs. Delta X_2, the difference between X_2 and the control point location. The model for this regression is:

$$Prop = 1 - \frac{1}{(1 + e^{(A + B \times DeltaX_2)})}$$

where Prop is the proportion of days at or below 2 ppt.

Parameter	Degrees of Freedom	Value	p value
R-squared		0.94	<0.0001
A	1	-0.2596	<0.0001
B	1	0.18279	<0.0001
Error	136	-	-

Table 3. Results of overall model in which the proportion of days not over 2 ppt at a control point, Prop, is predicted from year, log of unconstrained flow, and control point position X_c. The equation, using the symbols in previous tables, is:

$$Prop = 1 - \frac{1}{(1 + e^{(A + B \times Year + C \times LogQ + D \times X_c)})}$$

Parameter	Degrees of Freedom	Value	p value
R-squared		0.92	<0.0001
A	1	-19.7529	<0.0001
B	1	-0.04731	<0.0001
C	1	9.54710	<0.0001
D	1	0.176863	<0.0001
Error	134	-	-

Table 4. Days of salinity ≤ 2 ppt for several flow values using 1975 level of development.

Unconstrained	Days of salinity ≤ 2 ppt		
Flow, MAF	Roe Is.	Chipps Is.	Confluence
5	1	4	14
10	12	51	96
15	48	110	136
20	91	135	145
25	119	144	148
30	134	147	149
35	141	148	150

Figure 1. Effect of averaging period on percent days < 2 ppt in a month, vs. Delta X_2 (Difference between X_2 and station location): A, No averaging; B, 14-day running average; C, CCWD scheme; D, cumulative average of increasing values up to 2 ppt

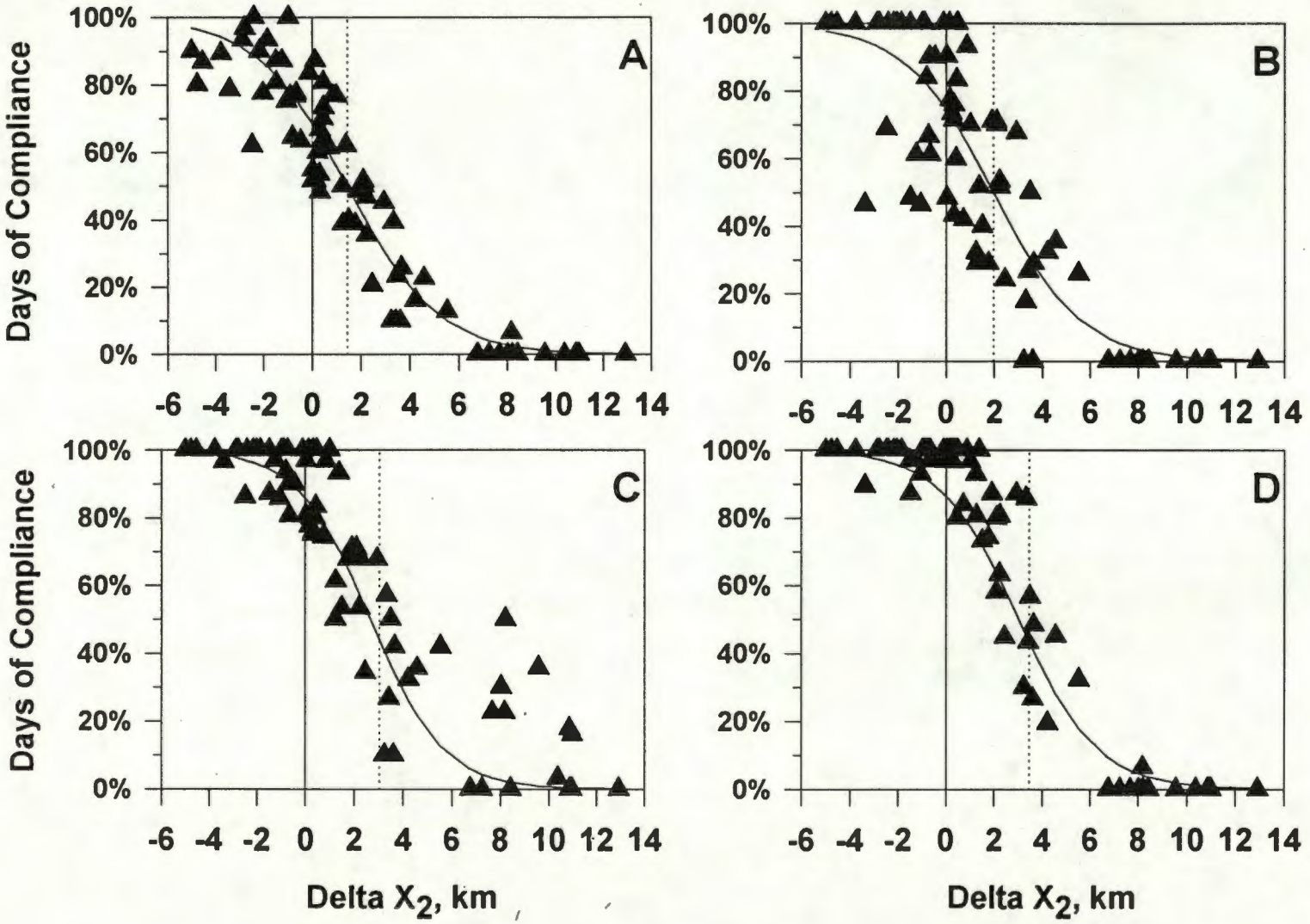


Figure 2. Calculation of model predicting number of days < 2 ppt:
A, X_2 predicted from year and log flow; B, Percent of days < 2ppt vs. distance from station to X_2
C, Percent of days < 2 ppt predicted from model; D, Residuals from model.

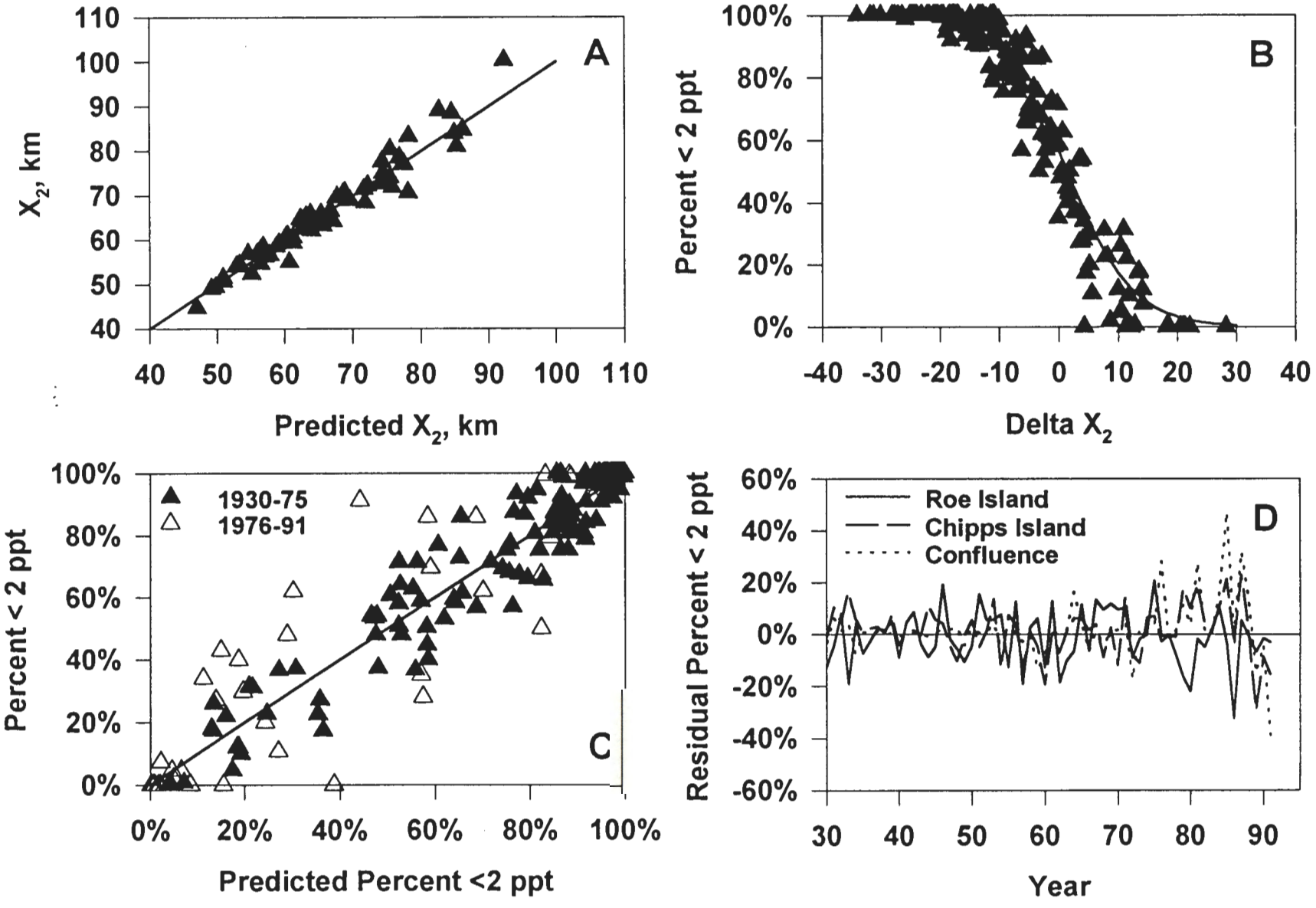


Figure 3. Predicted percent days < 2 ppt showing effects of year and flow

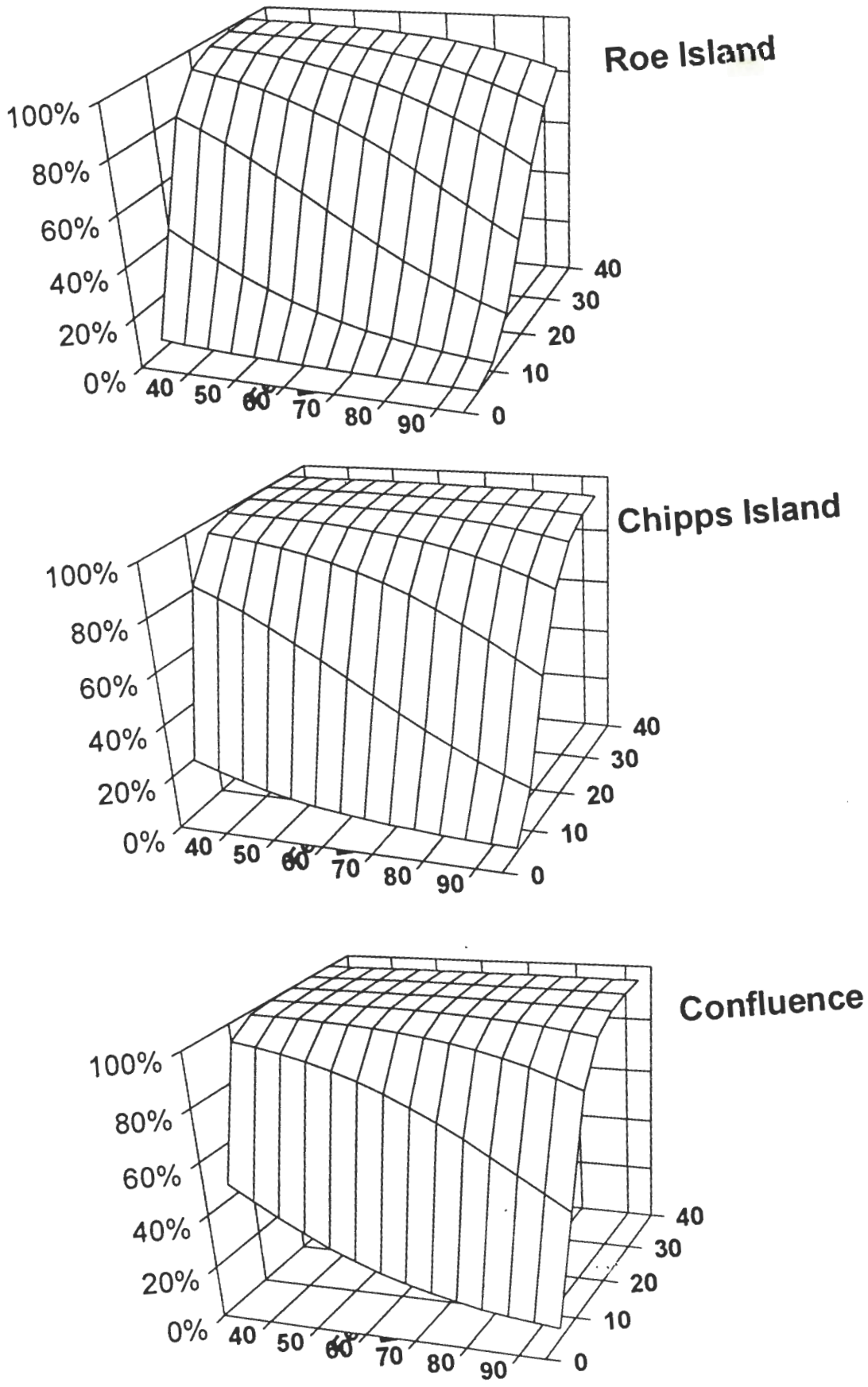


Figure 4. Predicted days < 2 ppt vs. unconstrained flow for 4 reference years

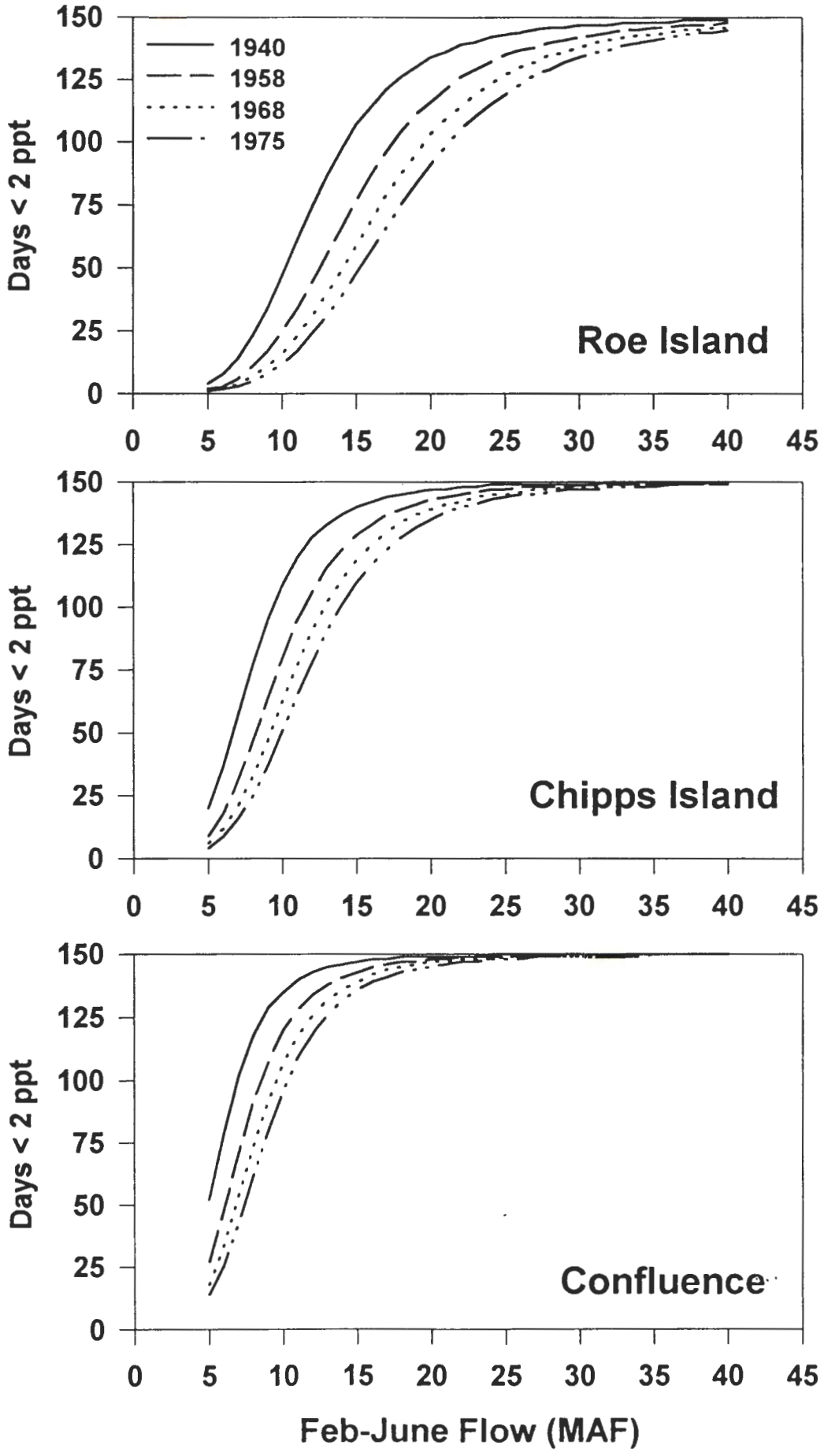
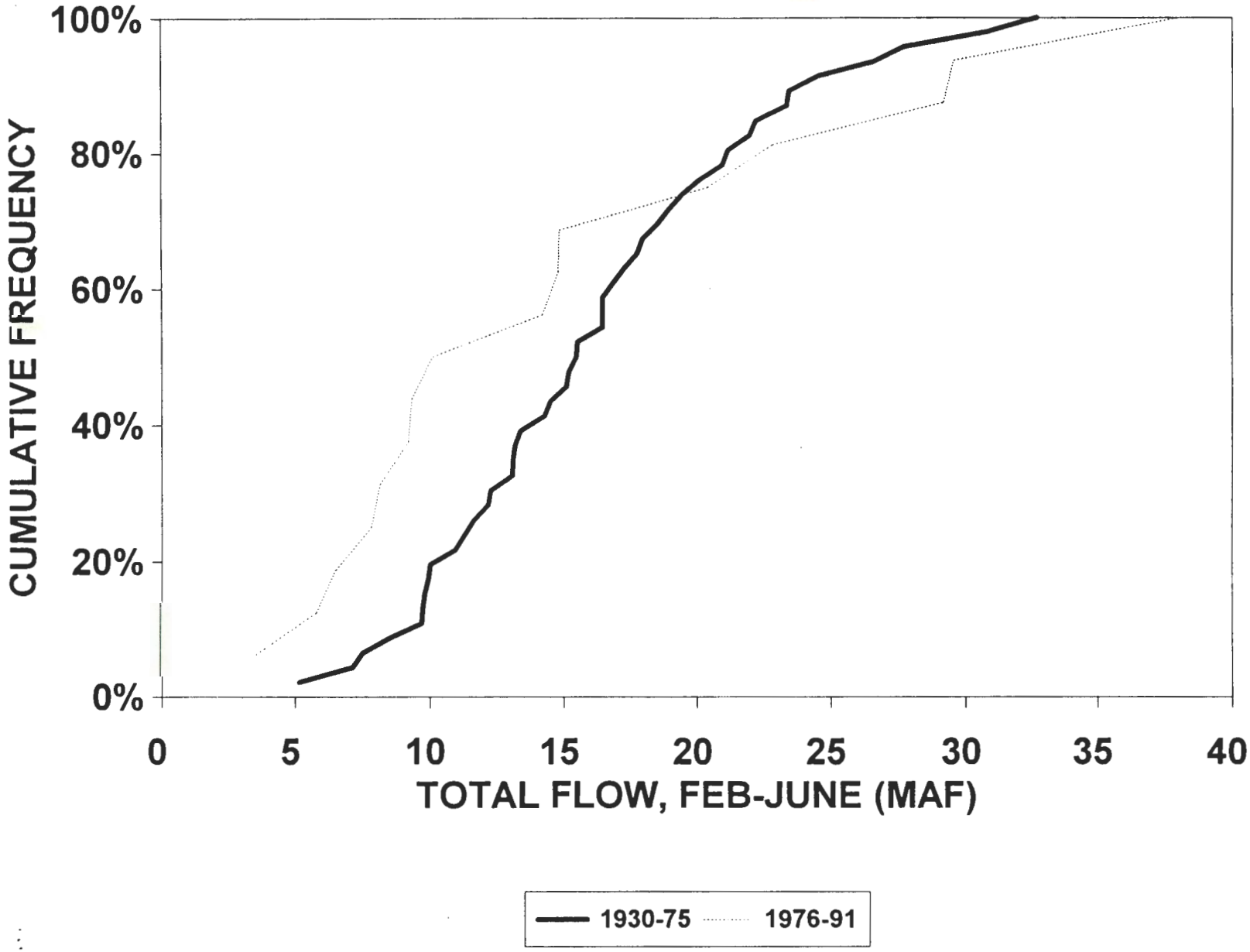


Figure 5. Frequency distribution of historical unconstrained flows for two time periods



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TO: MR. JOHN EMERSON
(O) (202) 456-7953
(FAX) (202) 456-2259

FROM: BRONSON VAN WYCK
(O) (501) 349-5562
(FAX) (501) 349-5592

RE: CALIFORNIA WATER MEETING
MARCH 7TH, 1994

DTD: 3/10/94

I. We appreciate your assistance re: Administration's California water actions. We're hopeful meeting with you, Tom Epstein and Will Stelle was helpful.

II. Conclusion:

The Administration's lack of a current "champion" for the economic importance of California water is resulting in job loss, and a deteriorating economic base. Examples because of the water situation:

- Anheuser Busch questioning their expansion in California;
- Intel not building a new California facility;
- Long term lenders restricting credit - (Pru, Met, MONY $2 billion±);
- Short term lenders restricting credit - Dunavant ($100 million ±) and others, (Wells Fargo).

III. Future Action:

1. Emerson is to discuss the California water situation with DOI and EPA. We hope shortly, there will be a clarification of the Administration's priorities regarding California's economic growth, within environmentally responsible boundaries.

2. Attempts will be to develop/adjust Administration policy to improve opportunities for economic growth and job creation in California.

a. Regarding water availability, eliminate the "disconnect" between the Administration's stated desires and the lowest field personnel in EPA and DOI.

b. Develop "credibility and certainty" in the process of resolving California water problems thru the Administration's willingness to sign agreements with the State of California which address the issues of water standards, implementation and long term solutions.

3. In the week of March 21st, there will be a mutual update as to progress.

IV. Summary of Meeting Comments:

1. Historically, California just experienced over six years of drought (water shortage and higher costs). There are many specific examples, where this resulted in reductions in business net worth and restricted growth and investment.

2. Currently, methods chosen by the new Administration to implement regulations are resulting in a regulatory drought:

- the water supply amounts being 65% or less for Federal (CVP) system, and being 50% or less for State (SWP) system.

- in addition, newly announced Federal proposals could further reduce water amounts by 50% across the board.

- the economic impacts, according to several reliable sources, are greater than $3 billion vs. EPA's publicly stated estimate of $20 million.

3. Current policies further restrict growth in direct conflict with stated public policy. The severe impacts of the Administration's advocacy of a regulatory water drought makes issues of weather (rainfall), and "who's at fault" (State or Fed) no longer relevant in the opinion of the electorate. Additionally, a broad consensus agrees that previously valid mitigation measures, such as water transfers, are not currently viable.

V. **Meeting Attendees:**

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VI. <u>Other Knowledgeable Parties:</u>

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(Jeff Harris)
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TO: SENATOR DIANE FEINSTEIN
ATTENTION: SHANNON
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FROM: BRONSON VAN WYCK
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RE: MARCH 7TH WATER MEETINGS
IN WASHINGTON, D.C.

DTD: 3/10/94

(1) Everyone very much appreciates your interest and knowledge of the California water situation. Thank you for your time.

(2) Enclosed is a summary and a follow up of the meeting with Mr. John Emerson, Special Assistant to the President.

(3) One benchmark to measure the Administration's willingness to "champion" economic growth and job development in the Central Valley, and Southern California, is the Federal government's ability to sign meaningful agreements with California regarding a process to develop solutions and implement comprehensive surface water allocations.

(3) Winning "elections of the people" requires economic GROWTH. Club Fed policies and actions are restricting growth and justified by questionable science, and a law suit. This is in the face of occurring economic deterioration and against the basic rules of parity. (Those who benefit should share the cost.)

(4) Additionally, there is a broad consensus, and specific evidence, that water transfers, (marketing) mitigation measures, previously touted as major opportunities to lessen impacts, are not viable (possible) under current Fed policies and standards.

(5) We look forward to your visiting the Central Valley, and appreciate your leadership in helping to resolve this matter. We will try to keep you informed on all activities so hopefully, there will be no surprises.

3/4/94

On January 6, 1994 EPA (and Club FED) published in the Federal Register proposed rules to protect beneficial uses in the Sacramento-San Joaquin Bay-Delta Estuary.

CALIFORNIA'S WATER SUPPLIES AND THE PROPOSED FEDERAL DELTA WATER QUALITY STANDARDS

California Water Use Dependent On The Delta (1990 level)

- There are about 26 million people in California who are either wholly or partially dependent on water from the Sacramento and San Joaquin Rivers for their water supply.
- Over 20 million people and millions of acres of agriculture receive water directly pumped form the Delta.
- The Sacramento and San Joaquin Rivers have provided Californians with an average of nearly 15.5 million acre-feet annually for urban and agricultural uses.

Regulatory Environment And The Endangered Species Act

- SWRCB was attempting a balanced and comprehensive regulation of the Delta.
- Environmental Federal actions "derailed" the SWRCB process when NMFS, USFWS and EPA took over in individual areas: winter run salmon and Delta smelt (Endangered Species Act) and water quality (Clean Water Act); these actions went well beyond SWRCB planned actions.
- NMFS, USFWS, EPA and USBR joined to form Club FED to provide coordinated action and gave the State a federal entity to talk with.

Impacts Of Proposed New Federal Standards For The Bay-Delta

- Federal estimates place the reduction in exports at an average of 1.8 million acre-feet during critically dry years and 750,000 acre-feet in average years. This creates great uncertainty in the reliability of a critical portion of California's urban and agricultural water supplies. Combined existing system (CVP-SWP) capability during drought averages only 4.0 million acre-feet per year when working against an estimated 6.0 million acre-feet per year demand. There is considerable uncertainty in the 1.8 million acre-feet per year estimate. State studies show that the losses could be much greater.

- Sole use of a salinity standard by EPA does not address other important physical factors which have contributed to the decline of fisheries. The proposed standards may not fix the problem.

- The draft economic impact analysis is inadequate and incomplete. Even with an anticipated reworking of this analysis, it is not useful unless it deals with the implementation of standards by the State and a variety of technical issues which have been presented to EPA through public comment. The potential economic losses are greatly understated.

Implementation of Bay-Delta Standards

- Federal proposed regulations/standards need to be balanced with all needs/uses of the estuary; however, this is not part of the current process.

- EPA cannot implement its own standards; and, the State can only implement State-adopted standards and these must by law be balanced and reasonable and consider all competing beneficial uses.

- Only the State has the authority to allocate the burden of compliance and that will prove to be a costly and time consuming process.

- Federal interests need to be included in the long-term Delta decision-making process (BDOC).

Examples Of How Proposed Standards Could Be Made More Workable

- Recognize that the changing ecosystem is not necessarily a result of water project operations, but rather a multitude of causes including unscreened water diversions, non-native species, pollution over-fishing, etc., all of which need to be better understood and addressed.

- Consider the economic and social value of the water supply impacts.

- Allocate the burden of impacts via water rights process, fee structures, agreements, etc., among all users (not just SWP and CVP).

- Use flow standards instead of the uncertain salinity "surrogate" ("X2").

Congress of the United States
House of Representatives
Washington, DC 20515

March 24, 1994

The President
The White House
Washington, D.C. 20500

Dear Mr. President:

We understand that the departments of Commerce and the Interior, the Environmental Protection Agency, the California Resources Agency and the California Water Resources Control Board are engaged in discussions to establish a framework for a comprehensive approach to addressing the problems of the San Francisco Bay/Sacramento-San Joaquin River Delta.

We are writing to express our wholehearted support for that effort. An effective federal-state partnership in the Delta is absolutely essential to restoring the health of the Bay-Delta estuary and the vitality of California's economy.

Federal agencies simply cannot fulfill their responsibilities under various environmental protection statues without the cooperation of the state. Likewise, the state's efforts to provide for the long-term management of California's water resources cannot be successful without the active participation of the federal government. Until the estuary's immediate and long-term problems are addressed, the ecosystem will continue to decline and the agricultural and urban communities dependent upon Delta water supplies will remain gripped by crippling uncertainty.

We are greatly encouraged by the recent attempts to develop an integrated, comprehensive approach to the Delta. We are hopeful that the federal and state governments can soon conclude a formal agreement that embodies a commitment to meet all environmental mandates while minimizing water supply impacts.

Such an agreement should provide for better coordination and more flexibility in the operation of the state and federal projects so that water supply demands can be more effectively met within the constraints of the Endangered Species Act. The agreement also should establish a mutually acceptable process for setting and implementing water quality standards in the near term and outline a comprehensive planning process for the long term.

Most important, the agreement must provide certainty. Although any natural resource management plan must allow for necessary adjustments, regulatory actions in the Delta should be formulated so as to assure an extended period of reliable and predictable water supplies for agricultural, urban and environmental uses.

The discussions now underway between federal and state agencies represent a major step toward resolving one of California's most vexing problems. We urge you to personally monitor and actively encourage that effort.

Sincerely,

Vic Fazio

Gary Condit

Senator Dianne Feinstein

Robert T. Matsui

Rick Lehman

Norman Mineta

Cal Dooley

cc: Bruce Babbitt, Secretary, U.S. Department of the Interior
Ron Brown, Secretary, Department of Commerce
Carol Browner, Administrator Environmental Protection Agency
Douglas Wheeler, Secretary California Resources Agency

Tom Hagler

ENVIRONMENTAL
DEFENSE FUND

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April 20, 1994

Hon. Elizabeth Rieke
Assistant Secretary
U.S. Department of the Interior
18th and C Streets
Washington, D.C. 20240

Dear Ms. Rieke:

When you returned my call yesterday on the subject of the so-called Framework Agreement which you seem to be on the verge of negotiating on behalf of the United States with the State of California, I neglected to raise an additional issue of importance regarding this agreement.

It involves the State of California's cost-sharing obligations both under the Central Valley Project Improvement Act of 1992 and more generally for the completion of projects already well under way in the federal appropriations and construction process, such as the Shasta Dam temperature control device.

As you have already heard, EDF is skeptical of the agreement you are negotiating, based as it is on a premise of the State's good faith in committing itself once again to the adoption of protective water quality standards for the Bay/Delta estuary. We are skeptical as well of the United States' embarking upon still another open-ended EIS/EIR process, when it is having difficulty enough in keeping its CVPIA-mandated EIS process on track and when the Westlands Water District and other CVP contractors are demanding still more EIS's as a prerequisite to implementation of the CVPIA's environmental water allocations. Please inform us both as to where you believe any Congressional authorization for this new EIS appears and how much in federal expenditures you estimate it will take to complete the document.

The cost-sharing issue, however, may be the most crucial obstacle of all to the State's full participation in a serious effort to resolve Bay/Delta problems. It is EDF's understanding that the State is unwilling to commit even to attempting to resolve this issue until after it learns the results of June's bond issue elections. It seems to us that the least you can do in response is to suggest to the State that you will not sign the Framework Agreement until the State agrees to meet its cost-sharing obligations for projects currently under construction and mandated by existing law, and commits itself contractually to a reliable plan for cost-sharing the rest of its CVPIA's obligations. As you know, Governor Wilson several times has publicly committed the State to join in the implementation of the CVPIA, but so far no State financial contributions have been forthcoming.

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In EDF's judgment, and we hope in yours, the United States' top priority must be the full implementation of the CVPIA. Conversely, there is no reason to rush into a potentially very expensive commitment to an open-ended joint planning process with the State.

We have always suspected that for many involved in the Bay/Delta Oversight Council process at the State level, the Council is basically an effort to obtain political "cover" for another attempt at authorizing a Peripheral Canal. Why the United States should be so anxious to involve itself in this kind of an exercise, given all the other problems we have enumerated, is unclear to EDF.

Sincerely yours,

Thomas J. Graff
Senior Attorney

TJG:mr

cc: Hon. Douglas Wheeler

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION IX
75 Hawthorne Street
San Francisco, CA 94105-3901

JUN 10 1994

George Barnes
Calif. Dept. of Water Resources
1416 Ninth St.
Sacramento, CA 95814

Dear Mr. Barnes:

EPA would appreciate DWR's help in estimating the water supply impacts of several possible formulations of standards to protect estuarine habitat and salmon smolt migration through the delta.

We have attempted to minimize the number of runs required to evaluate the impacts of several alternatives described in comments to us on our draft standards. We anticipate that the results of these runs will help in developing an effective and efficient standard but none of these formulations should be construed as our 'preferred alternative.'

We have not included any modeling conditions that relate to the style of standard setting described by yourself at the Bay/Delta Modeling Forum workshop on sliding scales. If you can get the data needed to perform a comparable DWRSIM run, we would be very interested in the results.

It appears that the use of 'Year' as a variable in the regression equation as developed in comments by CUWA and WRMI addresses the same problem addressed in the DWR comments on the need to account for level of development. The regression equation is a simpler approach so we are using it as a surrogate for all of the efforts to quantify the impacts of LOD. If you believe that the DWR approach is not adequately encompassed by this approach we would be very interested in a DWRSIM run that compares the two at the same target level of development. However, we are not requesting one at this time simply to reduce the work associated with our request.

We request the following combinations of requirements to be run:

1. 1955 LOD with Roe Island triggered and salmon protective measures
2. 1968 LOD with Roe Island triggered and salmon protective measures
2' 1968 LOD with Roe Island triggered and alternative salmon measures
2" 1968 LOD with Roe Island triggered, salmon protective measures and NMFS's winter-run opinion requirements
2"' 1968 LOD without Roe Island but with salmon protective measures

3. 1968 LOD with Roe Island but without salmon protective measures
4. 1975 LOD with Roe Island triggered and salmon protective measures
5. 1975 LOD without Roe Island but with salmon protective measures
6. salmon protective measures alone

The daily requirements for three levels of development are included in three LOTUS files on the enclosed diskette: 55loddays.txt, 68loddays.txt, and 75loddays.txt. The contents of these files are included as an attachment to this letter.

In all but the cases noted, please include the following salmon smolt protective measures, as we still believe that they represent a set of implementation measures which would approximate the level of protection appropriate:

> Delta Cross Channel closed April through June
> Total exports not above 1500 cfs for 4 weeks, April 15 May 15
> Total exports for the rest of April through June not above 4000 cfs
> Minimum Flows at Vernalis for four weeks (April 15 - May 15) as follows:
> W 10,000 cfs; AN 8,000 cfs; BN 6,000 cfs; D 4,000 cfs; C 2,000 cfs

for alternative salmon protective measures in study 2' please use the same conditions except with 4,000 cfs minimum flows at Vernalis in both critical and dry years. For all San Joaquin requirements please use the San Joaquin River Index to establish year types.

We intend for these 9 runs to encompass the range of water costs addressed by EPA water quality standards although it may be that none of them exactly reflect the final determination. The highest priority is for the suite of conditions at 1968 LOD as these give the most information about the effect of structural differences in the standards.

In all cases please use a 6 MAF level of export demand in all years and a base condition of D-1485.

Trigger the Roe Island standard by reference to the best estimate of a 14 day moving average, as we have discussed for previous runs. Once triggered the requirement should remain in effect until less than .95 if a subsequent month is required. Thus, the standard might be triggered in February followed by requirements for all of March and some of April and May, in which case the requirement would be for X2 to be downstream of km 64 for all of February and March, at a location between km 64 and km 74 in April, but would not influence the requirement for May.

For the Chipps and Roe Island standards limit flow requirements to 11,400 and 29,200 cfs, respectively. For compliance with the confluence please rely on the modeled salinity, which may require increases in delta outflow in January of some years.

By presenting the requirements as monthly proportions we hope that we have facilitated the weighting that was used earlier to represent the required number of days in

DWRSIM's monthly time steps. In most cases the requirements are either very close to 1 or to zero; in these cases the standard would either require compliance at the site or at the next site upstream. At intermediate values the standard should be satisfied for the month at the proportionate distance downstream from the upstream site. Thus, if Roe Island is required .50 of the month of April in a given year, then the criteria to be met in DWRSIM should be at river km 79 (midway between the station and the next station upstream). Because the logarithmic relationship between flow and X2 location is contained in the model you are using to estimate flow needs this procedure should provide a good approximation.

We realize that these studies represent a substantial effort on DWR's part and we are grateful for this contribution to the development of standards that will protect the estuary with the smallest impact on other uses.

Regards,

For Bruce Herbold

1955 LOD		Chipps Island				Roe Island				
YEAR	feb	mar	apr	may	jun	feb	mar	apr	may	jun
1907	1.00	1.00	1.00	1.00	1.00	0.87	0.97	1.00	1.00	0.00
1908	1.00	1.00	0.96	0.93	0.30	0.81	0.69	0.40	0.18	0.00
1909	1.00	1.00	1.00	1.00	0.99	0.99	0.98	0.83	0.86	0.00
1910	1.00	1.00	1.00	1.00	0.83	0.88	0.79	0.93	0.86	0.00
1911	1.00	1.00	1.00	1.00	1.00	0.94	0.91	0.97	0.99	0.00
1912	1.00	1.00	0.75	0.02	0.84	0.54	0.20	0.17	0.01	0.00
1913	1.00	1.00	0.46	0.98	0.83	0.68	0.23	0.09	0.30	0.00
1914	1.00	1.00	1.00	1.00	1.00	0.99	0.93	0.88	0.95	0.00
1915	1.00	1.00	1.00	1.00	1.00	0.74	0.97	0.80	0.89	0.00
1916	1.00	1.00	1.00	1.00	0.99	0.93	0.96	0.96	0.95	0.00
1917	1.00	1.00	0.95	1.00	0.99	0.45	0.87	0.38	0.87	0.00
1918	1.00	1.00	0.99	1.00	0.25	0.20	0.33	0.68	0.44	0.00
1919	1.00	1.00	0.99	1.00	0.97	0.54	0.87	0.61	0.78	0.00
1920	1.00	1.00	0.82	0.95	0.78	0.20	0.06	0.21	0.19	0.00
1921	1.00	1.00	1.00	1.00	0.97	0.94	0.87	0.89	0.55	0.00
1922	1.00	1.00	0.98	1.00	1.00	0.48	0.80	0.49	0.71	0.00
1923	1.00	1.00	0.67	1.00	0.93	0.72	0.32	0.14	0.59	0.00
1924	1.00	1.00	0.01	0.00	0.00	0.19	0.30	0.01	0.00	0.00
1925	1.00	1.00	0.95	1.00	0.94	0.41	0.96	0.39	0.76	0.00
1926	1.00	1.00	0.83	1.00	0.07	0.31	0.87	0.21	0.75	0.00
1927	1.00	1.00	1.00	1.00	0.98	0.81	0.98	0.80	0.94	0.00
1928	1.00	1.00	1.00	1.00	0.67	0.61	0.64	0.96	0.73	0.00
1929	1.00	1.00	0.42	0.03	0.23	0.23	0.28	0.08	0.01	0.00
1930	1.00	1.00	0.99	0.96	0.11	0.62	0.60	0.62	0.22	0.00
1931	1.00	1.00	0.31	0.00	0.00	0.34	0.12	0.06	0.00	0.00
1932	1.00	1.00	0.98	0.98	0.98	0.59	0.60	0.52	0.26	0.00
1933	1.00	1.00	0.89	0.31	0.15	0.28	0.06	0.28	0.04	0.00
1934	1.00	1.00	0.90	0.03	0.00	0.64	0.50	0.28	0.01	0.00
1935	1.00	1.00	0.95	1.00	0.99	0.75	0.49	0.37	0.99	0.00
1936	1.00	1.00	0.99	1.00	0.94	0.90	0.96	0.62	0.76	0.00
1937	1.00	1.00	1.00	1.00	1.00	0.18	0.75	0.75	0.75	0.00
1938	1.00	1.00	1.00	1.00	1.00	0.74	0.96	0.99	0.98	0.00
1939	1.00	1.00	0.90	0.75	0.00	0.33	0.14	0.28	0.09	0.00
1940	1.00	1.00	1.00	1.00	0.95	0.93	0.97	0.97	0.92	0.00
1941	1.00	1.00	1.00	1.00	1.00	0.94	0.96	0.92	0.92	0.00
1942	1.00	1.00	0.96	1.00	0.99	0.94	0.96	0.41	0.92	0.00
1943	1.00	1.00	1.00	1.00	0.92	0.95	0.83	0.95	0.86	0.00
1944	1.00	1.00	0.91	0.20	0.84	0.33	0.44	0.29	0.03	0.00
1945	1.00	1.00	0.95	0.98	0.95	0.48	0.93	0.39	0.30	0.00
1946	1.00	1.00	0.97	1.00	0.93	0.86	0.37	0.44	0.62	0.00
1947	1.00	1.00	0.98	0.68	0.04	0.24	0.49	0.53	0.08	0.00
1948	1.00	1.00	0.71	1.00	0.99	0.75	0.10	0.15	0.88	0.00
1949	1.00	1.00	1.00	1.00	0.86	0.18	0.18	0.76	0.53	0.00
1950	1.00	1.00	0.98	1.00	0.94	0.74	0.79	0.51	0.73	0.00
1951	1.00	1.00	0.99	0.98	0.75	0.91	0.90	0.58	0.30	0.00
1952	1.00	1.00	1.00	1.00	1.00	0.91	0.93	0.82	0.99	0.00
1953	1.00	1.00	0.94	1.00	0.86	0.96	0.47	0.35	0.52	0.00
1954	1.00	1.00	1.00	1.00	0.81	0.80	0.83	0.82	0.91	0.00
1955	1.00	1.00	0.40	0.32	0.79	0.52	0.20	0.08	0.04	0.00
1956	1.00	1.00	0.99	1.00	1.00	0.98	0.91	0.70	0.65	0.00
1957	1.00	1.00	1.00	0.85	0.96	0.33	0.80	0.78	0.12	0.00
1958	1.00	1.00	1.00	1.00	1.00	0.83	0.99	0.92	0.98	0.00
1959	1.00	1.00	0.92	0.77	0.01	0.81	0.78	0.31	0.10	0.00
1960	1.00	1.00	1.00	0.92	0.16	0.39	0.87	0.74	0.16	0.00
1961	1.00	1.00	0.91	0.39	0.07	0.37	0.69	0.29	0.05	0.00
1962	1.00	1.00	0.97	1.00	0.75	0.33	0.93	0.48	0.78	0.00
1963	1.00	1.00	0.94	1.00	1.00	0.71	0.95	0.36	0.98	0.00
1964	1.00	1.00	0.25	0.25	0.19	0.66	0.23	0.05	0.03	0.00
1965	1.00	1.00	0.92	1.00	0.95	0.97	0.73	0.31	0.93	0.00
1966	1.00	1.00	0.98	1.00	0.24	0.74	0.49	0.53	0.56	0.00
1967	1.00	1.00	1.00	1.00	1.00	0.91	0.78	0.88	0.76	0.00
1968	1.00	1.00	0.98	0.63	0.06	0.65	0.91	0.54	0.07	0.00
1969	1.00	1.00	1.00	1.00	1.00	0.98	0.95	0.77	0.97	0.00
1970	1.00	1.00	1.00	0.14	0.45	0.99	0.85	0.72	0.02	0.00
1971	1.00	1.00	1.00	1.00	0.98	0.89	0.60	0.83	0.60	0.00
1972	1.00	1.00	1.00	0.93	0.32	0.62	0.56	0.76	0.17	0.00
1973	1.00	1.00	1.00	1.00	0.99	0.94	0.91	0.75	0.44	0.00
1974	1.00	1.00	1.00	1.00	0.99	0.98	0.68	0.97	0.95	0.00
1975	1.00	1.00	1.00	0.99	1.00	0.45	0.84	0.92	0.34	0.00
1976	1.00	1.00	0.47	0.00	0.00	0.24	0.16	0.09	0.00	0.00
1977	1.00	1.00	0.00	0.00	0.00	0.15	0.04	0.00	0.00	0.00
1978	1.00	1.00	1.00	1.00	0.99	0.97	0.90	0.95	0.89	0.00
1979	1.00	1.00	0.99	0.97	0.99	0.63	0.69	0.66	0.23	0.00
1980	1.00	1.00	1.00	1.00	0.93	0.98	0.97	0.82	0.45	0.00
1981	1.00	1.00	0.98	0.82	0.05	0.67	0.57	0.51	0.11	0.00
1982	1.00	1.00	1.00	1.00	1.00	0.91	0.97	0.92	1.00	0.00
1983	1.00	1.00	1.00	1.00	1.00	0.94	0.98	1.00	0.94	0.00
1984	1.00	1.00	0.99	0.92	0.92	0.88	0.73	0.71	0.17	0.00
1985	1.00	1.00	0.74	0.98	0.06	0.36	0.32	0.17	0.29	0.00
1986	1.00	1.00	1.00	1.00	0.91	0.85	1.00	0.98	0.49	0.00
1987	1.00	1.00	0.98	0.07	0.00	0.32	0.47	0.54	0.02	0.00
1988	1.00	1.00	0.38	0.01	0.00	0.74	0.22	0.08	0.01	0.00

1989	1.00	1.00	1.00	1.00	0.08	0.37	0.22	0.97	0.68	0.00
1990	1.00	1.00	0.87	0.10	0.01	0.57	0.17	0.25	0.02	0.00
1991	1.00	1.00	0.99	0.28	0.16	0.09	0.03	0.57	0.04	0.00
1992	1.00	1.00	0.93	0.66	0.00	0.21	0.76	0.32	0.08	0.00

1968 LOD

YEAR	Chipps Island feb	mar	apr	may	jun	Roe Island feb	mar	apr	may	jun
1907	1.00	1.00	1.00	1.00	1.00	0.89	0.96	0.99	0.99	0.00
1908	1.00	1.00	0.91	0.55	0.06	0.83	0.55	0.21	0.06	0.00
1909	1.00	1.00	1.00	1.00	0.97	0.99	0.97	0.66	0.65	0.00
1910	1.00	1.00	1.00	1.00	0.43	0.89	0.67	0.84	0.65	0.00
1911	1.00	1.00	1.00	1.00	0.99	0.95	0.84	0.92	0.97	0.00
1912	1.00	0.98	0.59	0.00	0.45	0.57	0.12	0.08	0.00	0.00
1913	1.00	0.99	0.29	0.84	0.43	0.71	0.14	0.04	0.12	0.00
1914	1.00	1.00	1.00	1.00	0.99	0.99	0.87	0.75	0.86	0.00
1915	1.00	1.00	1.00	1.00	1.00	0.77	0.94	0.62	0.72	0.00
1916	1.00	1.00	1.00	1.00	0.93	0.93	0.92	0.91	0.86	0.00
1917	1.00	1.00	0.90	1.00	0.92	0.48	0.78	0.20	0.68	0.00
1918	1.00	1.00	0.99	0.95	0.05	0.22	0.21	0.46	0.20	0.00
1919	1.00	1.00	0.98	1.00	0.85	0.58	0.78	0.38	0.52	0.00
1920	1.00	0.03	0.68	0.61	0.35	0.22	0.03	0.09	0.07	0.00
1921	1.00	1.00	1.00	0.98	0.84	0.95	0.78	0.76	0.27	0.00
1922	1.00	1.00	0.95	0.99	1.00	0.52	0.69	0.27	0.43	0.00
1923	1.00	1.00	0.49	0.98	0.67	0.75	0.20	0.06	0.31	0.00
1924	1.00	1.00	0.00	0.00	0.00	0.22	0.19	0.00	0.00	0.00
1925	1.00	1.00	0.91	1.00	0.70	0.45	0.93	0.20	0.50	0.00
1926	1.00	1.00	0.70	1.00	0.01	0.35	0.79	0.10	0.48	0.00
1927	1.00	1.00	1.00	1.00	0.91	0.83	0.96	0.61	0.82	0.00
1928	1.00	1.00	1.00	1.00	0.23	0.64	0.49	0.91	0.46	0.00
1929	1.00	1.00	0.26	0.00	0.04	0.25	0.18	0.03	0.00	0.00
1930	1.00	1.00	0.98	0.68	0.02	0.65	0.45	0.39	0.08	0.00
1931	1.00	0.71	0.18	0.00	0.00	0.37	0.07	0.03	0.00	0.00
1932	1.00	1.00	0.96	0.77	0.88	0.62	0.45	0.30	0.10	0.00
1933	1.00	0.02	0.81	0.04	0.03	0.31	0.03	0.13	0.01	0.00
1934	1.00	1.00	0.81	0.00	0.00	0.67	0.36	0.13	0.00	0.00
1935	1.00	1.00	0.90	1.00	0.96	0.77	0.35	0.19	0.96	0.00
1936	1.00	1.00	0.98	1.00	0.71	0.91	0.93	0.39	0.50	0.00
1937	1.00	1.00	0.99	1.00	0.98	0.21	0.62	0.55	0.47	0.00
1938	1.00	1.00	1.00	1.00	1.00	0.77	0.94	0.97	0.95	0.00
1939	1.00	0.84	0.81	0.20	0.00	0.36	0.08	0.13	0.03	0.00
1940	1.00	1.00	1.00	1.00	0.74	0.94	0.95	0.93	0.77	0.00
1941	1.00	1.00	1.00	1.00	0.99	0.95	0.93	0.83	0.77	0.00
1942	1.00	1.00	0.92	1.00	0.97	0.95	0.93	0.22	0.78	0.00
1943	1.00	1.00	1.00	1.00	0.63	0.96	0.73	0.88	0.66	0.00
1944	1.00	1.00	0.83	0.02	0.45	0.36	0.30	0.14	0.01	0.00
1945	1.00	1.00	0.91	0.84	0.76	0.52	0.88	0.20	0.12	0.00
1946	1.00	1.00	0.93	0.99	0.69	0.87	0.25	0.24	0.33	0.00
1947	1.00	1.00	0.96	0.16	0.01	0.27	0.35	0.31	0.03	0.00
1948	1.00	0.33	0.54	1.00	0.94	0.78	0.06	0.07	0.69	0.00
1949	1.00	0.97	0.99	0.97	0.49	0.20	0.11	0.56	0.26	0.00
1950	1.00	1.00	0.96	1.00	0.71	0.76	0.67	0.29	0.46	0.00
1951	1.00	1.00	0.97	0.83	0.32	0.92	0.83	0.35	0.11	0.00
1952	1.00	1.00	1.00	1.00	1.00	0.92	0.88	0.65	0.97	0.00
1953	1.00	1.00	0.88	0.97	0.48	0.97	0.33	0.17	0.25	0.00
1954	1.00	1.00	1.00	1.00	0.40	0.83	0.73	0.65	0.76	0.00
1955	1.00	0.99	0.25	0.04	0.37	0.56	0.12	0.03	0.01	0.00
1956	1.00	1.00	0.99	0.99	0.99	0.98	0.85	0.48	0.36	0.00
1957	1.00	1.00	0.99	0.32	0.78	0.37	0.69	0.58	0.04	0.00
1958	1.00	1.00	1.00	1.00	1.00	0.85	0.98	0.83	0.95	0.00
1959	1.00	1.00	0.85	0.22	0.00	0.83	0.66	0.15	0.03	0.00
1960	1.00	1.00	0.99	0.50	0.03	0.43	0.78	0.53	0.06	0.00
1961	1.00	1.00	0.83	0.05	0.01	0.40	0.56	0.14	0.01	0.00
1962	1.00	1.00	0.95	1.00	0.31	0.36	0.88	0.27	0.52	0.00
1963	1.00	1.00	0.89	1.00	0.98	0.74	0.91	0.18	0.92	0.00
1964	1.00	0.99	0.14	0.03	0.03	0.70	0.14	0.02	0.01	0.00
1965	1.00	1.00	0.84	1.00	0.76	0.97	0.59	0.15	0.80	0.00
1966	1.00	1.00	0.96	0.98	0.05	0.77	0.35	0.31	0.28	0.00
1967	1.00	1.00	1.00	1.00	1.00	0.92	0.66	0.74	0.49	0.00
1968	1.00	1.00	0.97	0.13	0.01	0.68	0.85	0.32	0.02	0.00
1969	1.00	1.00	0.99	1.00	1.00	0.99	0.92	0.57	0.91	0.00
1970	1.00	1.00	0.99	0.01	0.11	0.99	0.76	0.50	0.01	0.00
1971	1.00	1.00	1.00	0.99	0.89	0.90	0.45	0.66	0.31	0.00
1972	1.00	1.00	0.99	0.53	0.07	0.65	0.41	0.55	0.06	0.00
1973	1.00	1.00	0.99	0.95	0.97	0.94	0.85	0.55	0.19	0.00
1974	1.00	1.00	1.00	1.00	0.96	0.98	0.54	0.93	0.86	0.00
1975	1.00	1.00	1.00	0.88	0.99	0.49	0.75	0.82	0.14	0.00
1976	1.00	0.94	0.30	0.00	0.00	0.27	0.10	0.04	0.00	0.00
1977	1.00	0.00	0.00	0.00	0.00	0.17	0.02	0.00	0.00	0.00
1978	1.00	1.00	1.00	1.00	0.96	0.97	0.83	0.89	0.71	0.00
1979	1.00	1.00	0.98	0.72	0.94	0.66	0.54	0.43	0.09	0.00
1980	1.00	1.00	1.00	0.95	0.68	0.98	0.95	0.64	0.20	0.00
1981	1.00	1.00	0.96	0.27	0.01	0.70	0.42	0.29	0.04	0.00
1982	1.00	1.00	1.00	1.00	0.99	0.93	0.95	0.83	0.99	0.00
1983	1.00	1.00	1.00	1.00	1.00	0.95	0.96	0.99	0.83	0.00
1984	1.00	1.00	0.99	0.51	0.64	0.89	0.60	0.49	0.06	0.00
1985	1.00	1.00	0.58	0.82	0.01	0.39	0.21	0.07	0.11	0.00
1986	1.00	1.00	1.00	0.97	0.61	0.87	0.99	0.96	0.23	0.00
1987	1.00	1.00	0.97	0.01	0.00	0.36	0.33	0.32	0.01	0.00

1988	1.00	0.99	0.23	0.00	0.00	0.76	0.14	0.03	0.00	0.00
1989	1.00	0.99	1.00	0.99	0.01	0.40	0.13	0.93	0.39	0.00
1990	1.00	0.95	0.77	0.01	0.00	0.60	0.10	0.12	0.01	0.00
1991	1.00	0.00	0.97	0.03	0.03	0.10	0.02	0.35	0.01	0.00
1992	1.00	1.00	0.86	0.14	0.00	0.24	0.64	0.16	0.02	0.00

1975 LOD		CHIPPS Island				Roe Island				
YEAR	feb	mar	apr	may	jun	feb	mar	apr	may	jun
1907	1.00	1.00	1.00	1.00	0.99	0.90	0.94	0.98	0.97	0.00
1908	1.00	1.00	0.88	0.24	0.02	0.84	0.47	0.14	0.03	0.00
1909	1.00	1.00	1.00	1.00	0.92	0.99	0.96	0.54	0.50	0.00
1910	1.00	1.00	1.00	1.00	0.21	0.90	0.59	0.76	0.49	0.00
1911	1.00	1.00	1.00	1.00	0.98	0.95	0.79	0.87	0.94	0.00
1912	1.00	0.00	0.50	0.00	0.23	0.59	0.09	0.05	0.00	0.00
1913	1.00	0.00	0.22	0.57	0.22	0.73	0.10	0.02	0.06	0.00
1914	1.00	1.00	1.00	1.00	0.97	0.99	0.83	0.65	0.76	0.00
1915	1.00	1.00	0.99	1.00	0.99	0.78	0.92	0.50	0.58	0.00
1916	1.00	1.00	1.00	1.00	0.84	0.94	0.90	0.86	0.76	0.00
1917	1.00	1.00	0.86	1.00	0.81	0.50	0.72	0.13	0.53	0.00
1918	1.00	0.06	0.98	0.83	0.02	0.24	0.16	0.34	0.11	0.00
1919	1.00	1.00	0.97	0.99	0.68	0.59	0.72	0.27	0.37	0.00
1920	1.00	0.00	0.60	0.29	0.17	0.24	0.03	0.06	0.04	0.00
1921	1.00	1.00	1.00	0.92	0.65	0.95	0.72	0.66	0.16	0.00
1922	1.00	1.00	0.93	0.98	1.00	0.54	0.61	0.19	0.28	0.00
1923	1.00	0.05	0.40	0.94	0.43	0.76	0.16	0.04	0.19	0.00
1924	1.00	0.03	0.80	0.00	0.00	0.23	0.14	0.00	0.00	0.00
1925	1.00	1.00	0.87	0.99	0.46	0.47	0.90	0.13	0.34	0.00
1926	1.00	1.00	0.62	0.99	0.00	0.36	0.73	0.06	0.33	0.00
1927	1.00	1.00	0.99	1.00	0.78	0.84	0.94	0.49	0.71	0.00
1928	1.00	0.99	1.00	0.98	0.10	0.66	0.41	0.86	0.31	0.00
1929	1.00	0.02	0.19	0.00	0.02	0.27	0.13	0.02	0.00	0.00
1930	1.00	0.98	0.97	0.36	0.01	0.67	0.38	0.28	0.04	0.00
1931	1.00	0.00	0.13	0.00	0.00	0.39	0.05	0.02	0.00	0.00
1932	1.00	0.98	0.94	0.47	0.73	0.64	0.37	0.21	0.05	0.00
1933	1.00	0.00	0.74	0.01	0.01	0.32	0.02	0.08	0.01	0.00
1934	1.00	0.82	0.74	0.00	0.00	0.69	0.29	0.08	0.00	0.00
1935	1.00	0.76	0.86	1.00	0.91	0.79	0.28	0.13	0.92	0.00
1936	1.00	1.00	0.97	0.99	0.47	0.92	0.90	0.28	0.34	0.00
1937	1.00	1.00	0.99	0.99	0.94	0.22	0.55	0.42	0.32	0.00
1938	1.00	1.00	1.00	1.00	1.00	0.78	0.92	0.94	0.91	0.00
1939	1.00	0.00	0.75	0.06	0.00	0.38	0.06	0.09	0.02	0.00
1940	1.00	1.00	1.00	1.00	0.51	0.94	0.93	0.89	0.64	0.00
1941	1.00	1.00	1.00	1.00	0.99	0.95	0.91	0.74	0.64	0.00
1942	1.00	1.00	0.89	1.00	0.91	0.95	0.91	0.15	0.65	0.00
1943	1.00	1.00	1.00	1.00	0.39	0.96	0.66	0.82	0.50	0.00
1944	1.00	0.48	0.77	0.01	0.23	0.38	0.24	0.09	0.00	0.00
1945	1.00	1.00	0.87	0.58	0.54	0.54	0.85	0.13	0.07	0.00
1946	1.00	0.17	0.91	0.96	0.45	0.88	0.19	0.16	0.21	0.00
1947	1.00	0.78	0.95	0.05	0.00	0.28	0.28	0.21	0.01	0.00
1948	1.00	0.00	0.45	1.00	0.86	0.79	0.04	0.04	0.55	0.00
1949	1.00	0.00	0.99	0.91	0.26	0.21	0.08	0.44	0.16	0.00
1950	1.00	1.00	0.94	0.98	0.48	0.78	0.59	0.20	0.31	0.00
1951	1.00	1.00	0.96	0.57	0.14	0.93	0.78	0.25	0.06	0.00
1952	1.00	1.00	1.00	1.00	1.00	0.93	0.84	0.53	0.94	0.00
1953	1.00	0.67	0.83	0.90	0.26	0.97	0.26	0.11	0.15	0.00
1954	1.00	1.00	0.99	1.00	0.20	0.84	0.66	0.53	0.62	0.00
1955	1.00	0.00	0.18	0.01	0.17	0.58	0.09	0.02	0.01	0.00
1956	1.00	1.00	0.98	0.96	0.96	0.98	0.81	0.36	0.23	0.00
1957	1.00	1.00	0.99	0.11	0.56	0.38	0.62	0.46	0.02	0.00
1958	1.00	1.00	1.00	1.00	1.00	0.86	0.97	0.74	0.91	0.00
1959	1.00	1.00	0.79	0.07	0.00	0.84	0.58	0.10	0.02	0.00
1960	1.00	1.00	0.99	0.21	0.01	0.45	0.72	0.41	0.03	0.00
1961	1.00	1.00	0.76	0.01	0.00	0.42	0.48	0.09	0.01	0.00
1962	1.00	1.00	0.93	0.99	0.14	0.38	0.84	0.18	0.37	0.00
1963	1.00	1.00	0.85	1.00	0.94	0.75	0.88	0.12	0.87	0.00
1964	1.00	0.00	0.10	0.01	0.01	0.71	0.11	0.01	0.01	0.00
1965	1.00	1.00	0.79	1.00	0.53	0.97	0.51	0.10	0.68	0.00
1966	1.00	0.76	0.95	0.93	0.02	0.78	0.28	0.21	0.17	0.00
1967	1.00	1.00	1.00	0.99	0.99	0.92	0.59	0.63	0.34	0.00
1968	1.00	1.00	0.95	0.04	0.00	0.70	0.80	0.22	0.01	0.00
1969	1.00	1.00	0.99	1.00	1.00	0.99	0.89	0.45	0.84	0.00
1970	1.00	1.00	0.99	0.00	0.04	0.99	0.70	0.38	0.00	0.00
1971	1.00	0.98	1.00	0.95	0.74	0.91	0.37	0.54	0.19	0.00
1972	1.00	0.94	0.99	0.23	0.03	0.67	0.34	0.43	0.03	0.00
1973	1.00	1.00	0.99	0.82	0.91	0.95	0.80	0.42	0.11	0.00
1974	1.00	1.00	1.00	1.00	0.90	0.98	0.46	0.89	0.77	0.00
1975	1.00	1.00	1.00	0.66	0.97	0.51	0.68	0.73	0.08	0.00
1976	1.00	0.00	0.23	0.00	0.00	0.28	0.07	0.02	0.00	0.00
1977	1.00	0.00	0.00	0.00	0.00	0.18	0.01	0.00	0.00	0.00
1978	1.00	1.00	1.00	1.00	0.90	0.98	0.78	0.82	0.57	0.00
1979	1.00	1.00	0.98	0.40	0.86	0.68	0.46	0.32	0.05	0.00
1980	1.00	1.00	0.99	0.84	0.44	0.98	0.94	0.52	0.12	0.00
1981	1.00	0.96	0.94	0.09	0.00	0.72	0.35	0.20	0.02	0.00
1982	1.00	1.00	1.00	1.00	0.98	0.93	0.93	0.75	0.99	0.00
1983	1.00	1.00	1.00	1.00	1.00	0.95	0.95	0.98	0.72	0.00
1984	1.00	1.00	0.98	0.22	0.39	0.90	0.52	0.37	0.03	0.00
1985	1.00	0.05	0.48	0.54	0.00	0.41	0.16	0.05	0.06	0.00
1986	1.00	1.00	1.00	0.88	0.36	0.88	0.99	0.93	0.14	0.00
1987	1.00	0.65	0.95	0.00	0.00	0.37	0.26	0.22	0.00	0.00

1988	1.00	0.00	0.17	0.00	0.00	0.78	0.10	0.02	0.00	0.00
1989	1.00	0.00	1.00	0.97	0.01	0.42	0.10	0.89	0.25	0.00
1990	1.00	0.00	0.69	0.00	0.00	0.62	0.07	0.07	0.00	0.00
1991	1.00	0.00	0.96	0.01	0.01	0.11	0.01	0.24	0.01	0.00
1992	1.00	1.00	0.81	0.04	0.00	0.25	0.56	0.10	0.01	0.00

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*** ACTIVITY REPORT ***
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TRANSMISSION OK

TX/RX NO.	7528
CONNECTION TEL	919166536077
CONNECTION ID	
START TIME	06/10 14:38
USAGE TIME	05'34
PAGES	10
RESULT	OK